

USEPA Review of the Draft Parcel G Removal Site Evaluation Work Plan, Hunters Point  
Naval Shipyard, San Francisco, California, June 15, 2018  
USEPA Review dated August 8, 2018

**Blue = Relates to trigger for 100% excavation- separate out**

**Green = Attorney pay special attention, but this item does not refer to trigger for 100% excavation**

**Yellow = Needs additional action (mostly for Lily, unless otherwise indicated)**

**Underline = John please pay special attention**

TO DO (Lily):

- formal comments re trigger for 100% excavation
- Eliminate redundant comments or create cross-references
- Cluster similar comments or separate long comments into separate individual comments
- Check to see if want to switch any individual comments from General to Specific or vice versa
- Check original 3/26 comments & Navy RTC's to see if anything left out

**COVER NOTE on Part 1 comments**

For efficiency, EPA is first sending the part of its more technical comments that address generally the initial testing. We will later send a second part of comments by August 14 that address generally the longer term decisions about next steps after receiving testing results. The second set of comments may also include matters related to the initial testing. EPA will also review all comments the public submits to the Navy's workplan, and we may add or revise our comments after that review.

On February 9, 2018, the Navy gave agencies for review a draft Work Plan that described the general approach applicable to any parcel. The US Environmental Protection Agency (EPA), State of California Department of Toxic Substances Control (DTSC), and California Department of Public Health (CDPH) made comments in writing in March, 2018, to the Navy. In addition, at that time, the regulators also made recommendations for the approach to retesting specifically in Parcel G to inform Navy subsequent development of a Task Specific Plan for that parcel. The approach described in the June 15, 2018, draft workplan does not reflect the recommendations in many important ways. Many of the enclosed comments repeat comments and recommendations EPA already made March 26, 2018.

For example,

- **Need trigger for 100% excavation.** The draft Workplan does not specify that if one location is found in a trench unit (TU) above ROD remedial goals (RGs) plus

background, and it is not proven to be NORM, then 100% of the TUs must be excavated. It instead proposes Risk Assessment.

- **In Phase 2, EPA previously recommended 100% of surface scan of trench units and building site survey units after removing cover material.** The June 15, 2018, draft Work Plan only proposes to scan above core sample locations.
- **In Phase 2, core sampling needs to include more locations** than 6 locations inside original trench boundaries and 6 locations outside original trench. The number of locations of the number need to be determined statistically based on variability inside original boundaries.

Without these changes, and others below, the approach will not be able to provide the confidence that the retesting can establish when Parcel G will be suitable for redevelopment. More details will appear in comments below.

## GENERAL COMMENTS

1. **Executive Summary:** The next draft of the Parcel G Work Plan will receive a great deal of attention from the public. Laypeople reading it would benefit from a summary that is more understandable to a general audience, e.g. similar to the fact sheet that the Navy already distributed June, 2018, to accompany the June, 2018, draft Parcel G Work Plan. EPA recommends that the Navy update its fact sheet to reflect the next draft version of the Work Plan, distribute that updated fact sheet to the public, and insert the updated fact sheet into the beginning of the next draft before the Executive Summary.
- 2.
3. **Section 1, Introduction:** This section states that a separate Sampling and Analysis Plan (SAP) will be prepared for the investigation at Parcel G, however the SAP has not yet been provided for review. The revised and updated SAP should be issued for review by the Regulatory Agencies prior to initiation of work at Parcel G. Information provided in the Parcel G Work Plan and the SAP and any other supplemental documents (e.g. a Task Specific Plan) should incorporate all of the technical, as well as quality control (QC) requirements for sample collection and analysis, data validation, assessment and reporting, along with copies of standard operating procedures for all of these processes. The technical information should include the method number, calibration information and quantitation parameters. The QC information should include daily/weekly efficiency, energy and background checks as applicable; and results for matrix spikes (MS), duplicates, blanks, Laboratory Control Samples (LCS) samples, tracers (alpha spectroscopy), and the following method-specific parameters:

Gross alpha/beta Scans for Buildings Scan MDCs are below Investigation Levels for all ROCs

Gamma Scans, Gross alpha/beta Scans Scan MDCs are below the Investigation Levels for all ROCs

Gamma Spectrometry Static measurements or laboratory analysis

- Sample results should include all radionuclides detected along with count times, result, counting error, and isotope specific minimum detectable concentrations (MDCs)
- Demonstration that radionuclide-specific MDCs that are 10% of the ROC(s) RGs can be achieved.
- A copy of the gamma spectrometry analysis library

Alpha Spectrometry (See more detail in comment below)

- All Uranium and thorium isotopes by alpha spectroscopy for samples with elevated Ra-226, count times, results, counting and total propagated uncertainty, MDC, tracer recovery
- Demonstration that the Uranium (U)-234, U-235, U-238, Thorium (Th)-230, and Th-234 MDCs at 10% of the Radium (Ra)-226 RG can be achieved.

Please provide a response regarding when the SAP will be issued for review by the regulatory agencies. Also, please ensure the Parcel G Work Plan and SAP include all of the specifics describing all radiation surveys, sample collection and analysis technical and QC requirements as described above.

4. **Section 1, Introduction:** For context to the reader, please clarify that other future work plans will address other aspects of the site where Tetra Tech EC Inc. has previously performed radiological work. For example, EPA commented in March, 2018, "Tetra Tech EC Inc. also conducted radiological cleanup work in ship berths. The Navy should also address potential contamination in this and any other category of past radiological work by Tetra Tech EC Inc. at the HPNS." Please insert language to convey this larger context into the introduction.
5. **Section 2, Conceptual Site Model:** The Parcel G Work Plan did not address all of the previous EPA comments provided on the Draft Work Plan, Radiological Survey and Sampling, dated February 2018. The revised draft does not reflect the CSM that is cited in every draft RACR the Navy has produced, which states that contamination could have come from any leaks in storm drain/sewer lines, which could have been a result of many factors that could have occurred at any locations along the lines. The Navy and the EPA, DTSC, and CDPH have a fundamental philosophical difference of approach. The Navy presumes the site is clean and that this retesting is for the purpose of confirming that assumption through spot checking. The EPA, DTSC, and CDPH found that the original testing is completely unreliable. Therefore, we are relying on the original CSM that states that "INSERT QUOTE." Therefore, until receiving any evidence to the contrary, the underlying assumption should be that new comprehensive testing, i.e., starting from scratch, is necessary. The regulators are open to evidence for an alternative CSM, i.e. if no contamination above ROD RG's is found after excavating 33% of TU's selected as the most likely to have contamination. Only with solid evidence of a change in CSM would regulators be open to any alternative to excavation of 100% of TU's. The Parcel G Work Plan was not updated to address requested revisions to the Conceptual Site Model (CSM) (See General

**Commented [A1]:** Here's a potential quote from the Executive Summary of the Parcel B Rad RACR:

"Based on its radiological operational history, the DON determined that low-level radioactive contamination potentially present in some buildings, storm drain and sanitary sewer lines, soil, debris, and slag material at HPNS required a response action. This decision was documented in the final "Base-wide Radiological Removal Action, Action Memorandum" (AM) (DON 2006). Physical removal with proper off-site disposal was selected as the only viable remedial alternative."

Comment # 21 in EPA's December, 2017, comments on the radiological data evaluation for Parcels B and G. This CSM was the basis for the EPA's March 2018 comments on the Navy's February, 2018, draft Work Plan). Please ensure future versions of the Parcel G Work Plan address the CSM updates requested by EPA, and/or that the updated Master SAP address EPA's comments on the CSM.

[INSERT SOME FROM BELOW General Comment # 21 in EPA's December, 2017, comments on the radiological data evaluation for Parcels B and G

21. Section 2.1 of the Report presents a brief description of the conceptual site model (CSM). However, it is not complete. This should be revised to include more detail. The final Radiological Removal Action Completion Reports (RACRs) for Parcels B and G, Section 2.2 Conceptual Site Model, both cite the *Navy Memorandum for the Record: Conceptual Site Model for the Removal of the Sanitary and Storm Sewers at Hunters Point Shipyard*, December 17, 2008. Below are excerpts from that memo:

Section 2, Background, p.1-2: "Contamination . . . could have come from rework and repair of radioluminescent devices (Ra-226 and Sr-90), NRDL [Naval Radiation Defense Laboratory] experimentation and development of radiation survey instrumentation (Ra-226, Cs-137, and Sr-90), or decontamination of ships that participated in atomic weapons testing. . . . radiological operations at HPS started in 1941 and concluded in 1974 with the closure of the shipyard. During this time, controls of radioactive materials, particularly involving radioluminescent devices, were much more relaxed than today's standards and any radiological operation could have potentially impacted the sewer system. . . . Slip fittings were used at pipe joints of the sewer system, therefore the lines were not sealed and some leakage from the pipe was expected when the system was built. Additionally, excavated manholes have been found to be porous. The potential for materials to migrate from piping and manholes into the surrounding soils is significant."

Section 3b., Conceptual Site Model, p. 2: "Historically, the systems were cleaned, repaired, and replaced as necessary. In addition to potential normal seepage, all three of these operations could have released contaminations [sic] into soils surrounding the systems. In fact, cleaning was often accomplished by power washing that could have forced the contamination from the system and in some cases leave the piping free of contamination but the surrounding soils contaminated. . . . Power washing of old sewer systems easily cracks the pipes and allows for releases of pipe sediment into surrounding soils."

Section 3c. Conceptual Site Model, p. 3: "To date, the removal action has demonstrated the accuracy of the conceptual site model."

Section 3d. Conceptual Site Model, p. 4, shows that as of December 9, 2008, the Navy found 6.9% of contaminated soil in Parcel B (including Parcel D-2) trenches and 12.2% of Parcel G. This represented 93.8% of the Parcel B trench units and 58.5% of the Parcel G trench units.

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Section 4a Ongoing Removal Operations, p. 5: "93.8 percent of the sewer survey units in Parcel B . . . demonstrates the validity of the CSM [Conceptual Site Model]. Most contamination has been found in the soils surrounding the pipes, primarily below five feet. This is consistent with the pipe locations and the fact that repairs to the system or power washing would have resulted in the spread of contamination well beneath and

beyond the piping system.”

EPA has also discussed site conditions with contractors that worked at Hunters Point and conducted oversight of removal action, and they provided the following information:

- a. During three attempts by the Navy while the shipyard was still in use to separate the storm drains and sanitary sewer lines, soil from piping would have been excavated and piled up beside the trenches and then returned to trenches. As a result, it is not possible to predict where contamination would be in the vicinity of the storm drains and sanitary sewers.
- b. It is also known that the sanitary sewers on Parcels G, D-1, and D-2 (formerly all part of Parcel D), and E were in very poor condition based on the large groundwater depression that formed in these areas. Groundwater entered the sanitary sewers through cracks and gaps in the piping. After the lift station pumping was terminated, it took many years for normal groundwater flow conditions to be established; remnants of this depression can be seen in Parcel E on the A- Aquifer groundwater elevation contour maps through November 2015. It is likely that differential settling and earthquakes caused the cracks and gaps in this system and that the storm drain system had similar cracks and gaps.
- c. Furthermore, the seagates in the storm drain system did not work well. As a result, it is possible that incoming tides moved contaminated sediment inland into lines that would not have been expected to have been contaminated. Numerous Parcel B and G forms indicate that sufficient sediment was present to sample and count in some lines. When radionuclide contamination was found above cleanup levels, the Base-wide Radiological Work Plan required that the bottom of the trench be sampled. This occurred in some trenches.
- d. Finally, much of the piping was found to be in poor condition and could not be removed intact from the SD/SS trench excavations. In some cases, the Parcels B and G forms note that there was shattered or broken piping. Any sediment in the bottom of this broken piping was likely mixed with the soil in the trenches, rather than being removed.

This Conceptual Site Model is the basis for selection in the Parcels B and G the Records of Decision (RODs) for Parcels B and G of alternative R-2, the Workplan that Tetra Tech EC, Inc., was required to follow, over alternative R-1, which was “No action.” For Parcels B and G, no alternative between these levels of effort was analyzed. Please revise Section 2.1 to add more detail such as information in the above record about the Conceptual Site Model.]

6. The Draft Parcel G Removal Site Evaluation Work Plan, Hunters Point Shipyard, San Francisco, California (the Work Plan) proposes including cleanup criteria that are not documented in the Parcel G Record of Decision (ROD). The following sections contain language regarding additional cleanup criteria at Parcel G which are not documented in the Parcel G ROD and as such do not meet the statutory requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP) of 40 CFR §300.430 Remedial investigation/feasibility study and selection of remedy:

- The Project Purpose section of the Executive Summary, states, "Portions of soil or structures at Parcel G that are not compliant with the RAO [Remedial Action Objective] specified in the Parcel G Record of Decision (ROD)] will be evaluated for protectiveness based on the United States Environmental Protection Agency's (USEPA's) current guidance on Radiation Risk Assessment at CERCLA Sites, Radiation Risk Assessment at CERCLA Sites (USEPA, 2014) [Radiation Risk Assessment at CERCLA Sites]."
- However, this guidance document does not state that 12 mrem/yr is an acceptable cleanup standard.
- The Executive Summary, Phase I discussion states, "To the extent practicable, soil with ROCs [radionuclides of concern] at concentrations above the RGs [remedial goals] will be evaluated further using USEPA's current guidance on Radiation Risk Assessment at CERCLA Sites."
- The Data Evaluation and Reporting states, "If the investigation results demonstrate that site conditions are not compliant with the Parcel G RAO, then the data will be evaluated to determine whether site conditions are protective of human health using USEPA's current guidance on Radiation Risk Assessment at CERCLA Sites (USEPA, 2014). A removal site evaluation report will be developed to include recommendations for further action."

EPA Directive 9200.4-40 was issued as guidance only and as such, is not a regulatory requirement or a ROD-established cleanup level for the Hunters Point Naval Shipyard site in accordance with the CERCLA process as promulgated in 40 CFR §300.430. Please revise these sections of the Parcel G Work Plan to state that only areas that are demonstrated to comply with the Parcel G ROD requirements will be eligible for Regulatory Agency approval and release. Without a change in the CSM, EPA cannot agree to a ROD amendment. [Entire comment needs attorney review, Lily needs to add language to clarify that the 2014 Q&A does not say 12 mrem/yr is an acceptable cleanup goal. Any changes in RG's would require a ROD Amendment]

Commented [A2]: Added this to the first bullet point

7. The Parcel G Work Plan does not provide information about the path forward should contamination be identified anywhere within the Phase I Trench Units (TUs) or Survey Units (SUs). Per the regulator's request and previous comments, if contamination is identified in any of the initial 33 percent (%) of TUs/SUs, then all of the TUs/SUs in Parcel G (100%) will require excavation and investigation. Please revise the Parcel G Work Plan to include this requirement. Similarly, Figure 3-2, Performance Criteria for Demonstrating Compliance with the Parcel G ROD – Soil, does not include a step in the logic diagram for the next steps to be taken if Ra-226 exceeds the RG (1.0 pCi/g above background). Please revise Figure 3-2 to include a complete logic diagram demonstrating actions that will occur if Ra-226 is found to exceed the RG in any sample.
8. The Parcel G Work Plan does not address the gamma survey parameters for investigating the potential presence of radiological objects such as deck markers containing Strontium-90 (Sr-90) in soil. It is understood that the gamma scan survey can be used to detect the bremsstrahlung radiation caused by Sr-90 using the gamma surveys but the Parcel G Work

Plan does not discuss using the gamma scan or static measurements to collect such data. Please revise the Parcel G Work Plan to include information about how the gamma surveys will be used to identify the presence of Sr-90 in soil for investigating the potential presence of radiological objects in soil.

9. **Section 3.3 and 4.3, Remediation Goals for soil and buildings, respectively:** The text states that the building data from the radiological investigations will be evaluated to determine whether site conditions are compliant with the Remedial Action Objectives (RAOs) in the Parcel G Record of Decision (ROD) and as listed in Table 4-2, Building Remediation Goals for Structures. EPA has previously recommended that risk evaluation should use the current versions of the USEPA's Preliminary Remediation Goals (PRG) Calculator for soil and the Building PRG Calculator for buildings (BPRG). The Navy had previously agreed to perform such a review of the ROD RG's no later than the current fourth Five-Year Review. This information is crucial to inform the new work performed under this Work Plan, which should use cleanup criteria that reflect findings of the updated risk evaluations to ensure the protectiveness of the cleanup. Please revise the Parcel G Work Plan to require meeting the ROD RGs. [Lily needs to add language from HQ Stuart Walker and colleagues]
10. **Section 3.3 and 4.3, Remediation Goals for soil and buildings, respectively:** The Parcel G Work Plan should explain how compliance with RGs will be evaluated if more than one ROC is identified. Cleanup goals should include an analysis of the sum of fractions and the unity rule to ensure total risk to the Reasonably Maximally Exposed (RME) individual posed by multiple ROCs in soil or buildings does not exceed the CERCLA risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . Please note that "Consistent with existing Agency guidance for the CERCLA remedial program, . . . EPA generally uses  $1 \times 10^{-4}$  in making risk management decisions."<sup>1</sup> Please revise the Parcel G Work Plan to explain how compliance with RGs will be evaluated when more than one ROC is identified.
11. **Section 3.3.1, Investigation Levels, Table 3-6, Soil Survey Measurement Investigation Levels:** This section indicates that Investigation Levels are not applicable to the gamma scan surveys for Cesium (Cs)-137, and the footnote states that Cs-137 cannot be detected with the proposed gamma detector/gamma scan survey method at the RG of 0.113 pCi/g. Please describe how Cs-137 will be investigated in a manner that is compliant with a MARSSIM survey design for which gamma scanning of 100% of the land area is completed with a detector capable of achieving the project -required detection limit and data quality objectives for the project. If alternative gamma measurement detectors with a better sensitivity that will allow Cs-137 to be identified at the RG above background (e.g. lanthanum bromide detector), then the Parcel G Work Plan should be revised to propose such a radioanalytical detection system. Alternatively, the Parcel G Work Plan should list the gamma scan survey achievable detection limit for Cs-137 and discuss how the survey(s) and sample collection will meet the data quality objectives for demonstrating that the survey unit is compliant with the ROD RG for Cs-137. This is critical to the success of the data investigation. Please revise the Parcel G Work Plan to address this concern.

**Commented [A3]:** Note: Jana and Brianna both reviewed this, and I incorporated Brianna's comment, which Jana approved.

<sup>1</sup> OSWER Directive 9200.4-40, EPA 540-R-012-13, May 2014, Q34, p. 27.

12. **Section 3.3.1, Investigation Levels:** The proposed investigation levels are inconsistent with the methodology proposed for the gamma scan surveys. Section 3.3.1 (Investigation Levels) states gamma scan surveys will be performed using detector systems equipped with gamma spectroscopy to provide real-time radionuclide-specific measurements, and the spectra will be evaluated using regions of interest peak identification tools for the ROCs that correspond to gamma rays at 186 kiloelectron volt (keV) for Ra-226, 609 keV for Bismuth-214 (bi-214), and 662 keV for Cs-137. However, the text does not state how the gamma scan can achieve sufficient detection limits for Ra-226 using the Ra-226 energy line at 186 keV due to the low efficiency at this energy, or the Bi-214 609 keV line without a 21-day ingrowth period, especially when the investigation level is the same as the RG of 1 picoCurie per gram (pCi/g) above background. Additionally, Table 3-6 contains a footnote that states the gamma scan cannot achieve the detection limit necessary to detect Cs-137 at the RG of 0.113 pCi/g above background, yet the preceding text states that the gamma scan will be used to flag locations where Cs-137 exceeds the investigation level, defined in Table 3-6 as 100% of the RG, or 0.113 pCi/g above background. Please revise the Work Plan to address these concerns.

13. **Section 3.4.4, Phase I Trench Unit Investigation:** This section states that TUs will be over-excavated outside the estimated previous boundaries of the sidewalls and bottom and will be gamma scan surveyed and sampled ex-situ. The Parcel G Work Plan Table 3-1, Phase 1 Soil Trench Units indicates that the sidewalls and floor will be combined into one survey unit. However, the Parcel G Work Plan does not describe what action will be taken if any ROC exceedances above the RGs are identified in the ex-situ scanning of the sidewall/floor survey unit(s). In the event that an exceedance above any of the ROD ROC RGs is identified in the ex-situ scanning of the sidewall/floor survey units, the Parcel G Work Plan should require that the sidewalls and floor of the associated trench be scanned and sampled to identify where contamination may still be present in the excavated trench. Please revise the Work Plan to specify that if an exceedance of any ROC RG's is found in the scanning of the sidewall/floor survey units in the Radiation Screening Yards, then the Navy will scan the entire sidewalls and bottom and take systematic soil samples to identify the location(s) of the exceedances in the associated trench. Furthermore, please revise the Work Plan to specify that if an exceedance is found, the trench will not be backfilled before until any additional excavation that may be needed occurs.

**Commented [A4]:** This is not currently part of the plan. They dig, scan, sample, and fill in the trenches before writing a report.

14. **Section 3.4.4, Phase 1 Trench Unit Design:** The EPA, DTSC, and CDPH have prioritized trench units (TUs) for excavation using criteria listed in the EPA, e.g., Historical documentation of specific potential upstream sources, signs of potential falsification found in data evaluation, signs of data quality problems found in data evaluation, allegations from former workers, and regulators' independent field testing. The regulators' prioritization is partially consistent with the Phase I Soil Trench Units identified in the Navy's draft Work Plan. We concur with Phase I TUs 69, 76, 78, 99, 101, 103, 104, 107, 108, 109, and 124. However, four of our highest priority TUs (TUs 97, 98, 115, and 121) are not included. These four TUs should be substituted for four of the 10 other TUs (i.e., those not listed above) that were identified as Phase I Soil TUs. Please make this change. The remaining soil TU's should be determined based on criteria such as those listed above that indicate the highest likelihood of contamination. In addition, EPA previously made comments to the Navy about the categories of concern in a letter to the Navy on March [LLY INSERT]



DATE], 2017. Choosing to prioritize a particular TU for logistical convenience due to TU's being adjacent is not an acceptable justification without independent evidence that this TU is among 33% of trench units most likely to have contamination based on the information we have to date.

#### 15. Section 3.1.4, Number of Samples:

Although under some circumstances, 18 samples per survey unit could be acceptable as a default starting point before sampling results are available, once these results are available, then the number of samples for subsequent survey units should be based on calculations using variability found in actual data. For example, EPA's statistician used background data the Navy had previously collected from five reference areas and calculated that 25 samples per survey units would be needed to achieve a 99% confidence level if soil from TUs/SUs are compared to reference background areas using a Wilcoxon Rank Sum Test. EPA recommended starting with this default number of samples. Once new data are collected, they can also be used to recalculate the appropriate number of samples depending on the statistical tests which will be utilized to establish compliance. The new number could be higher or lower than previously used. Note that the variance from site investigative samples may be larger than the variance based on reference background samples, therefore the variance from samples collected in investigative survey units should be used to calculate the number of samples that should be collected in other investigative survey units. Also, variance should be determined using the same radioanalytical method as that which will be used for additional data collection. For instance, the variance for gamma spectrometry laboratory data should be used to determine the number of samples that are required for survey units where gamma spectrometry laboratory analysis will be conducted.

This section contains an inconsistent sampling scheme and does not comply with the requirements established in the Work Plan for number of samples required for each survey unit, as follows:

- The Parcel G Work Plan does not provide the basis for the number of samples planned to be collected from TUs/SUs. The Navy previously issued a Draft Work Plan, Radiological Survey and Sampling dated February 9, 2018, (February Draft Work Plan) which calculated the number of samples that would be collected from each SU using MARSSIM equation 5-1 for the Wilcoxon Rank Sum (WRS) test. The Parcel G Work Plan should use either the MARSSIM approach, or other statistically based criteria for selecting the number of samples that will be collected from each SU so that conclusions based on evaluation of the SU data can be defined by a statistical level of confidence and as such, are usable for decision-making. Please revise the Parcel G Work Plan to include this information.
- This section specifies the collection of twenty-five subsurface samples from each RBA location and twenty-five surface soil samples from the offsite (RBA-Bayview) location, but only requires five surface samples be collected from each of the on-site RBAs. The text does not state how or why it is appropriate to collect only five surface samples from each of the on-site RBAs when twenty-five samples will be collected from the surface of

**Commented [A5]:** Maybe we'll need to come up with a different shorthand version to describe the Feb draft to avoid confusion with the June version. Maybe we should call them Feb Draft and June Draft.

the off-site location, and twenty-five samples will be collected from each of the RBA subsurface areas. For the Bayview park offsite location, an important reason for sampling at this site is to get an indication of potential Cs-137 levels from fall-out, and to provide data that provides meaningful comparisons to on-site reference area data. Since on-site data will be collected from the surface and subsurface, we request that both surface and subsurface data be collected from the off-site Bayview park location in order to provide a more complete and thorough evaluation of Cs-137 deposition and background levels in the San Francisco Bay area/the Hunter's Point Naval Shipyard. EPA understands that using a drill rig may present practical challenges to obtaining subsurface samples at the Bayview park location; therefore the depth of subsurface samples collected will be based on the depth to which a hand auger can be used to collect the soil at the Bayview park. EPA appreciates the Navy's commitment to consult with a USGS Cs-137 expert in this process and in the field during sample collection. Please include this in the next version of the Workplan and provide any comments from that expert in the eventual report that will be prepared about the sampling results.

**Commented [A6]:** Jana, I added this based on the Thurs mtg, but please edit as needed.

- The fifth bullet indicates that the total number of samples to be collected for surface soils in the on-site RBAs is twenty-five, but the text states that five samples from each of the four on-site RBAs will be collected, which is only twenty samples, not twenty-five. The text in this section and the bulleted information should be revised to provide a consistent number of samples.
- Appendix A, Section 4.1.2 states that based on the statistical evaluations, the RBA report will include recommendations for combining similar data sets, and recommendations for selecting values or data sets representing background in soil, and conditions identifying situations when specific values or data sets may not be appropriate. Since statistical testing will be completed to determine if each of the RBA data sets are sufficiently comparable in order to combine the data, it is unclear how the collection of only five surface soil samples from each of the on-site RBAs would provide a sufficient number of data points for such a statistical data set comparison. The Work Plan should be revised to discuss how/why five data points is sufficient for identifying a population that can reliably be compared to another five-point data set to determine if the difference is statistically significant or not.

**Commented [A7]:** 7/10 phone call Navy said could increase number of samples. But only small areas have been found that could be unimpacted

Please revise the Parcel G WP to address these concerns.

16. **Section 3.4.5, Phase 2 Trench Unit Design, Page 3-7:** The text does not describe the percentage of land area for Phase 2 trenches will receive gamma scanning. The EPA stated in its March, 2018, comments, "To address the potential exposure to future residents, 100% surface scans would be required. The Navy must first remove any asphalt cover and any imported fill that may have been used to achieve the desired grade, i.e. not part of backfill that potentially came from an area excavated by Tetra Tech EC Inc. Any locations where scan results exceed the investigation level would require collection of biased samples." Please revise the workplan to reflect this step.

17. **Section 3.4.5, Phase 2 Trench Unit Design:** This section indicates six systematic locations will be cored to approximately 6 inches below the depth of previous excavation in the Phase II TUs. EPA recommends choosing the number of locations for cores based on the total number of systematic samples that would be needed for a surface, as described previously in EPA's General Comment # 20 in the March, 2018, comments. In the past 18 has been used as a default, but this number should be calculated based on the variability in the data actually collected, which may result in a total number higher or lower than 18. Please also ensure that the Parcel G Work Plan includes information about how the number of sample locations per SU will be determined using MARSSIM equations for the Wilcoxon Rank Sum (WRS) test, accounting for variability in the sample results as obtained from the new background study sample results.

Commented [A8]: corrected section number

18.

19. **Section 3.6.4, Phase 2 Trench Unit Investigation:** Three samples should be collected at each core, including those less than 4 feet in depth below ground surface (bgs). Please revise this section to specify three samples will be collected for each core regardless of the depth of the core.

20. **Section 4, Building Investigation Design and Implementation:** This section does not provide sufficient information to conduct a full evaluation of the sufficiency of the buildings investigation. The Navy's buildings data evaluation found significant enough extent of unreliable data that the Navy decided that none of the previous data could be used. Therefore the presumption is that all previous work should be redone as a completely new investigation, as if starting from scratch. Therefore, all of the specifics of a new building investigation/SAP should be provided in the Work Plan to adequately document the requirements of such an investigation. Please revise the workplan to specify a level of detail at least as thorough as typically done previously in Task Specific Plans for these buildings, as follows:

- Brief history of CSM along with a description of how survey units were identified and classified based on the CSM for each building, along with figures depicting the survey units and classifications, and sample locations.
- Complete listing of Data Quality Objectives (DQOs) for each Parcel, Survey Unit for land areas and for buildings
- All MARSSIM FSS design parameters, including the identification of the survey unit classifications and sizes, and number of samples required to be collected for the WRS test, and all of the associated calculation inputs, including the Lower Bound of the Gray Region (LGBR), standard deviation of previously collected data, relative shift, confidence level selected, etc. This information should also include the identification of investigation levels for all radiological survey types, elevated measurement comparison calculations, or any other inputs and decision rules associated with the FSS design. In addition, when multiple radionuclides may be present, the Work Plan should include the identification of the survey release limit and investigation level based on the sum of fractions and unity rule for all ROCs

- Description of the Investigation Levels or other triggers that will be used in Gamma Scan Surveys that would require a biased sample to be collected
- Listing of the specific radiological instrumentation that will be used for each scan and static survey, exposure rate measurements, and laboratory measurements with the associated achievable Minimum Detectable Concentration (MDC), required scan rates, count times (statics), minimum detectable count rate (MDCR) for surveys; smear/wipe sample instrument MDCs, and laboratory instrument MDCs. MDCs should be 10% of the Remedial Goals for all ROCs
- Inclusion of all of the technical, as well as QC requirements for sample collection and analysis, data validation, assessment and reporting, along with copies of standard operating procedures (SOPs) for all of these processes. The technical information should include the method number, calibration information and quantitation parameters for scans, wipes, and static measurements. The QC information should include daily/weekly efficiency, energy and background checks as applicable; and results for duplicates, blanks, Laboratory Control Samples (LCS) samples (laboratory analysis), or matrix spikes and tracer recovery (only for destructive laboratory analysis) for each analysis type and instrument.
- Copies of field and laboratory radioanalytical methods/Standard Operating Procedures (SOPs). SOPs should include the sample/aliquot size and count times needed to achieve the project-required detection limits at 10% of the RG, the error bars associated with the quantitation of all radionuclides, the nuclide library that will be used to identify the ROCs in the analysis, the data reduction and reporting procedures, and all instructions required to complete the analysis.
- Reference to the appropriate Quality Assurance Project Plan (QAPP)/Master Sampling and Analysis Plan (SAP) which define all technical and quality parameters for data collection.

One possible approach the Navy could choose is to incorporate by reference some portions of the original Task Specific Plans for individual Buildings that are still relevant today, e.g. building description, building history, locations of survey units, extent of testing in categories of these survey units, etc. However, some other aspects of previous Task Specific Plans may need new scrutiny and potential modification in light of remediation that has already occurred, updated CSM information, new questions about reliability of prior work by Tetra Tech EC Inc., or other newly identified information.

Please revise the Parcel G Work Plan to address these specific issues for the buildings investigation.

21. **Section 4, Building Investigation Design and Implementation:** The Parcel G Work Plan appears to depart from the previous practice of using the MARSSIM approach for identifying the parameters of a Final Status Survey (FSS) in order to demonstrate that a survey unit has

met the release criteria. The parameters defined by the MARSSIM approach include the survey unit class and size, and include calculations for determining the number of samples that would need to be collected in each survey unit to meet the assumptions of the Wilcoxon Rank Sum (WRS) statistical test with a specified level of confidence. The WRS test uses hypothesis testing to identify if the median of the site data is statistically the same or different than the median of the background data and as such provides a comparison of populations. This approach is well-established and accepted among many agencies for demonstrating that a survey unit has met the release criteria (derived concentration guidelines level [DCGL]) as determined by pathway modeling and exposure assessment. However, the EPA regulates cleanups in accordance with the CERCLA statutes which require demonstrating that regulatory standards and/or risk-based target cleanup levels for hazardous substances will not exceed a specified limit, or pose an Excess Lifetime Cancer Risk (ELCR) to a reasonably maximally exposed (RME) individual that exceeds the CERCLA risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ . As such, EPA has Superfund national guidance that recommends a more protective approach than MARSSIM in applying a point-by-point comparison between the investigative sample results and the RGs and which requires every exceedance of the RGs to be remediated. The more protective point-by-point approach has been used at the Hunters Point Naval Shipyard and most EPA Superfund sites nationwide for many years for both chemical and radiological cleanups. EPA expects that this approach will be applied in the retesting as well. Even though this approach is more protective than what MARSSIM prescribes, the Work Plan should still use the MARSSIM approach to design the parameters of the FSS, as it has for many years, for consistency and defensibility of the results. Please revise the Parcel G Work Plan to use the MARSSIM approach to design the parameters of the FSS and to require a point-by-point comparison between investigative sample results and the RGs, with remediation of areas where sample results exceed the RGs.

22. **Section 4, Buildings:** The number of samples determined to be required for building survey units should be calculated using the MARSSIM approach for the design of an FSS, and should be based on a parameters obtained from collection of site samples of the same media and survey or lab instrument. These parameters include an estimate of residual radionuclide concentrations and the variance ( $\sigma$ ) of results within a given survey unit or units. The value of  $\sigma$  may be obtained from earlier surveys, limited preliminary measurements, or a reasonable estimate. The estimate of  $\sigma$  includes both the real spatial variability in the quantity being measured and the measurement method uncertainty of the measurement method. Therefore, the initial number of samples may be based on information from previously collected data or may be estimated; however as newly collected data is obtained under the Parcel G Work Plan, the variance used to determine the appropriate number of samples needed to meet the assumptions of the WRS test should be updated based on the variance from the new data. In addition, since the variance is a measure of spatial variability and the measurement method uncertainty, it is important that the variance from the same radioanalytical technique be used to estimate the number of samples being collected for the same analysis type. For example, the variance from newly generated gamma static surveys should be used to calculate the number of static measurements required in other survey units where static measurements are will be used for the FSS data collection. Likewise, the variance from laboratory analysis of survey unit samples should be used to calculate the required number of samples needed to be collected in other survey units where the samples

**Commented [A9]:** Jana, here are my rough notes, please clean up.

**Commented [A10R9]:** Lily, Jana edited this, but it was so messy that I just copied and replaced the text. So the revised text is first and the deleted original follows. Your notes follow the deleted text.

collected for the FSS will be analyzed by the same method in the laboratory. If the variance from newly collected data is smaller than that obtained from historical data or assumptions made about the population, then fewer samples may be needed for sample collection in other survey units. Finally, the variance from scan, static, smear, or sample analyses in the laboratory can only be used for sample number calculations of the same media type. Therefore, the variance obtained from gamma static surveys on land areas should not be used to calculate the required number of samples that will need to be collected in buildings. Currently, the Parcel G Work Plan does not discuss the specifics of what variance will be used to calculate the required number of samples, or how newly collected data will be used to update the variance and the required number of samples in the FSS for on-going survey unit investigations. Please revise the Parcel G Work Plan to describe in detail how the required number of samples will be determined for building survey units.

**Commented [A11]:** Deleted – was a hold over from Lily's comments/request I look at the comment.

**23. Section 4, Building Investigation Design and Implementation:** In addition to the aforementioned deficiencies in the Parcel G Work Plan Buildings investigation documentation, the following additional concerns require additional discussion, as follows:

**Commented [A12]:** Changed this from a bullet to a numbered comment

- Section 4.1 (Data Quality Objectives) Step 5 – Develop Decision Rules states “If the investigation results demonstrate that site conditions are not compliant with the Parcel G RAO, then the data will be evaluated to determine whether site conditions are protective of human health using USEPA’s current guidance on Radiation Risk Assessment at CERCLA Sites (USEPA, 2014).” However, EPA Directive 9200.4-40 was issued as guidance only and is therefore not a regulatory requirement, nor does it satisfy the ROD-established cleanup level for the Hunter’s Point Naval Shipyard site in accordance with the CERCLA process as promulgated in 40 CFR §300.430. Please revise the Parcel G Work Plan to state that only areas that demonstrate compliance with the Parcel G ROD requirements and are within the CERCLA risk range using the most recent version of the EPA PRG Calculator for radionuclides will be eligible for Regulatory Approval for release.
- The Parcel G Work Plan does not explain why some buildings or portions of buildings will receive surveys and others will not. The Historical Radiological Assessment (HRA) Volume II should be used to summarize information about all buildings within Parcel G to provide justification for which buildings/areas will be surveyed. In addition, the justification should also include documentation from the data evaluation forms and conclusions regarding allegations of misconduct and fraud by the previous contractor, as well as Regulatory Agency input to this analysis.
- The text does not explain why MARSSIM Class 2 areas were not proposed around Class I areas when the entire building will not be surveyed.
- The Parcel G Work Plan does not provide justification for selection of the area in Building 401 where background data will be collected.

- The Parcel G Work Plan does not discuss how the number of static measurements for each survey unit was calculated.
- The Parcel G Work Plan does not state if additional wipe samples may be sent to the laboratory for destructive analysis for speciation to determine which radionuclide is contributing to the radiation if release limits are exceeded for either gross alpha or gross beta.
- The Parcel G Work Plan includes a listing of the investigation levels but does not specify whether exceedance of the investigation levels will result in the collection of bias samples or static measurements in buildings.
- The Parcel G Work Plan does not specify collecting data from locations where measurements and/or sampling may be necessary due to use of equipment, areas where potential cross-contamination may have occurred, or where waste disposal practices may have resulted in contamination in sinks, or drains. Examples include items of equipment and furnishings, building fixtures, drains, ducts, and piping. Many of these items or locations have both internal and external surfaces with potential residual radioactive material which should be surveyed for removable and fixed contamination.

Please revise the Parcel G Work Plan to address these concerns.

24. **Section 5.4 NORM Background Evaluation:** The proposed approach for performing a Naturally Occurring Radioactive Material (NORM) evaluation for site samples is insufficient for ensuring a complete and defensible analysis. The Executive Summary discussion of Data Evaluation and Reporting states "individual samples with gamma spectroscopy concentrations for Radium-226 (Ra-226) greater than the RG will be analyzed for Uranium-238 (U-238) and Ra-226 using comparable analytical methods. For that specific sample, the U-238 result will be used as a more representative estimate of the background value for Ra-226, and the Ra-226 concentration will be compared to the RG for Ra-226 using the revised background value." Per previous EPA comments, a sample with elevated Ra-226 above the RG should be analyzed for all uranium and thorium isotopes by alpha spectroscopy, and should be compared to data obtained in the gamma spectrometry analysis for all of the radionuclides listed in the Appendix A, Table 3-6, Analytical Sample Summary. This information is required due to the following reasons:

- U-238 results often have a large error bar/uncertainty associated with the result; therefore analysis of other radionuclides in the U-238 decay series should be performed to confirm the accuracy of the U-238 result.
- The alpha spectroscopy analysis for U-238 will also provide results for U-235 and U-234. All of the uranium isotopes reportable by alpha spectroscopy, including U-238, U-235, and U-234 should be reported in order to evaluate if the three uranium isotopes ratios indicate the uranium is present in natural abundance with uranium-238 at 99.2739–99.2752%, uranium-235 at 0.7198–0.7202%, and uranium-234 at 0.0050–0.0059%.

- Alpha spectroscopy analysis of thorium isotopes (Th-230 and Th-234) is requested to confirm the Uranium-238 result since Th-234 is the first daughter product of U-238. In addition, Th-230 is the immediate precursor to Ra-226 in this series; therefore analysis of this isotope will help confirm whether the U-238 decay series is in equilibrium.
- Gamma spectrometry analysis for Bismuth and Lead isotopes that are part of the Thorium and Uranium decay series. Potassium-40 (K-40) will provide further evidence of whether the ROCs detected in the analysis are from naturally occurring background or represent contamination.

Please revise the Parcel G Work Plan to require all samples with elevated Ra-226 results to be analyzed for all Uranium and Thorium decay series isotopes by alpha and gamma spectroscopy to provide sufficient documentary evidence regarding the NORM evaluation.

**Commented [A13]:** Jana will talk to Dave Kappelman re potential refinement of this comment.

- 25. The Appendix A, Soil Reference Background Area:** This section does not reference a Quality Assurance Project Plan (QAPP) or a task-specific work plan/sampling and analysis plan (TSP/SAP) which specifies the details of all quality and procedural requirements for this data collection project. Please revise Appendix A to include this information.
- 26. Appendix A, Soil Reference Background Area:** It is unclear whether the proposed background locations are suitable for collection of background samples because the Work Plan does not provide details about these locations. For example, it is unclear if there were any previous excavations (e.g., exploratory excavations, remedial excavations, fuel line removals, or sanitary sewer/storm drain removal excavations) in these areas. If any of these areas have previously been excavated, then it would be unsuitable for use as a reference background area (RBA). In addition, the location proposed in Parcel D-2 is near the foot of a steep slope where erosion and run-off may have concentrated radionuclides found in atmospheric fallout like Cs-137; if this is the case, this location is unsuitable as a background location. Further, the location proposed for Parcel UC-2 is near or at the bottom of a hillside, where runoff may also have concentrated Cs-137 and be unsuitable for use as a background site. Although the text describes these areas as "non-impacted," a detailed justification for each proposed background area should be provided. Please revise the text to include a detailed justification for each proposed background location and exclude any locations where erosion and runoff may have concentrated radionuclides found in atmospheric fallout.
- 27. EPA is making every effort to include in our formal comments every concern that we may have.** If significant new information comes to light, including related to public comments, or significant new insights result from further evaluation, EPA may supplement these comments at a later date.

## SPECIFIC COMMENTS

- 1. Table 2.1, Conceptual Site Model – Uncertainties, Page 2-5:** The Uncertainties section of Table 2-1 states storm drains and sewer lines, including one foot of soil surrounding the pipes were removed to within 10 feet of all buildings, and impacted buildings had the remaining



lines removed during surveys of the buildings. Non-impacted buildings are stated to have had surveys performed at ends of pipes and were capped. However, review of the Parcel G Data Evaluation Forms identified several instances of pipes being found in areas where they were thought to have previously been removed. Please revise the Uncertainty discussion in the Table 2.1 Conceptual Site Model to list this additional uncertainty.

- A. **Section 3.1, Data Quality Objectives, Step 5 – Develop Decision Rules, Page 3-1 and Step 7 – Develop the Plan for Obtaining Data, Page 3-2, and Section 4.1, Data Quality Objectives, Step 5 – Develop Decision Rules, Page 4-1:** The second decision rule is not consistent with the Regulatory Agency Approach, which the responses to comments state was incorporated into the Work Plan, nor is it consistent with the requirements of the Parcel G ROD, which states, “Buildings, former building sites, and excavated areas will be surveyed after cleanup is completed to ensure that no residual radioactivity is present at levels above the remediation goals. Excavated soil, building materials, and drain material from radiologically impacted sites will be screened and radioactive sources and contaminated soil will be removed and disposed of at an off-site low-level radioactive waste facility.” The ROD requires excavation of exceedences based on a point-by-point comparison with the RGs. This approach is consistent with past practice and with USEPA national guidance. The Regulatory Agency Approach requires excavation of all trenches if one exceedence is found. If the ROD requirements are not met, a ROD Amendment will be required. Please revise the approach to require excavation of any exceedences based on a point-by-point comparison with the RGs and background.

**Section 3.3.1, Investigation Levels:** This section defines investigation levels as media-specific, radionuclide-specific concentrations, or activity levels based on the remediation goals (RGs) that trigger a response, such as further investigation, if the investigation level is exceeded. The text also states that investigation levels are established for each instrument and vary with SU classification and measurement type. It is unclear, however, why the investigation levels may vary by survey unit. Please remove text that indicates that the investigation levels would vary by survey unit.

2. **Section 3.5.2.2, Site Preparation, Page 3-13:** The second to the last bullet point states that after removal of the durable cover, “an additional 1 foot of durable cover buffer beyond the former excavation surface boundary will be removed,” but the Navy response to EPA Specific Comment 16 states that “anything removed will be surveyed.” Please revise the text to discuss whether excavation of this additional foot of soil is sufficient to account for regrading and clarify if this soil will be scanned and sampled or sorted.
3. **Section 3.6.3.1, Automated Soil Sorting System Process, Page 3-15:** It is unclear if a single sample of the diverted soil material will be sufficient to characterize this material, particularly if there is a large volume of diverted soil. Since soil can be diverted for reasons other than radiological alarms (e.g., low mass on the conveyor belt), it is important to collect sufficient samples to characterize this soil. Please revise the Work Plan to propose a volume-based sampling protocol with a one-sample minimum to characterize diverted soil.

**Commented [A14]:** Duplicative with GC #9

4. **Section 3.6.3.1, Automated Soil Sorting System Process:** This section provides a description of one alternative for gamma scans to screen soils from TUs/SUs at Parcel G, but clarification is needed:

- Please include a description of the detectors that will be used or the detection limits of those detectors.
- The text states that soils will be sorted based on radiological properties. Please provide specifics about which radiological properties will be monitored and used for segregation. Please explain if the alarm will be set to an investigation level or if it will be set at multiple levels such that alarms occur when one of the ROC RGs or investigation level is exceeded.
- This section indicates the details of such an operation are included in the Soil Sorting Operations Plan, but this Plan was not included in the Parcel G Work Plan. If this option is chosen, the Soil Sorting Operations Plan should be submitted for Regulatory Agency review and approval before soil sorting is implemented.

Please revise the Parcel G Work Plan to address these concerns.

**Section 3.6.3.2, Radiological Screening Yard Pad Process, Page 3-17:** This section states” Following completion of scanning activities, the excavated material will be returned to the same trench that the material originated from. [Please see General comment for **Section 3.4.4, Phase I Trench Unit Investigation [Lily fill in summary]**

Commented [A15]: Duplicates

5. **Section 3.6.4, Phase 2 Trench Unit Investigation, Page 3-17:** It may not be possible to collect cored samples to 6 inches below the depth of the original excavation if gravel was used to bridge the water table when the original excavation when backfilling occurred. Many of the open trenches in Parcel G contained groundwater because the water table is relatively shallow, so it is likely that gravel may have been used as backfill in some or all of these trenches. Trenches where gravel was or may have been used to bridge the water table should be identified so that an alternative sampling method (e.g., potholing) can be used. Please identify trenches where gravel was or may have been used to bridge the water table and propose an alternative sampling method to obtain samples from 6 inches below the depth of the original excavation.
6. **Section 3.6.4.1, Subsurface Soil Sample Collection, Page 3-18:** The text indicates that “use of a 3-inch-internal-diameter sampler may be required” in order to obtain sufficient sample volume for analysis, but it is unclear why drilling a second borehole adjacent to the first is not included as a potential method to collect sufficient soil. If the soil is sandy, it may not be retained in a 3-inch sampler, but may be retained in a smaller diameter sampler with a bottom basket. Please propose multiple potential methods for collection of sufficient sample volume.
7. **Section 3.6.7.2, Decontamination and Release of Equipment and Tools, Page 3-21:** The text discusses possible decontamination of equipment and tools at the completion of fieldwork, but this should not be optional because there could be chemical contamination in

addition to radiological contamination. In addition, decontamination of equipment and tools is necessary between sampling locations (e.g., shovels, trowels, mixing bowls, coring equipment). Please revise the Work Plan to provide a more complete decontamination plan and to require decontamination of all equipment and tools before they are removed from the site.

**Commented [A16]:** Moved to General Comment Section

8. **Section 5.5, Reference Background Area Soil Data, Page 5-6:** The text states that RBA data sets will be compared to each Trench Unit and Survey Unit (TU/SU) data to demonstrate the RBA data set for soil is representative of soil in each TU/SU by comparing the median of the two data sets to determine if there is a statistical difference in the medians. However, the text does not state how it will be determined that the soil sample(s) collected from the TU or SU used for this comparison will represent only background and not site contamination. Further, it is unclear why the Work Plan proposes to compare the medians of data populations between background soil and investigation unit soil rather than to perform the evaluation recommended by the U.S. Environmental Protection Agency (EPA). This evaluation includes analyzing the soil for the primordial naturally occurring parent and daughter radionuclides to determine if they are in secular equilibrium to identify whether the radionuclide ratios indicates the soil represents background. Please revise the Work Plan to require evaluation of secular equilibrium before any statistical comparisons are conducted.

9. **Section 5.6, Reporting, Page 5-7:** The text indicates that where a TU/SU exceeds the Parcel G ROD RAOs, the Removal Site Evaluation Report will include recommendations and options for further action, including the possibility of revising the Parcel G ROD in order to demonstrate the unit has met compliance criteria. EPA has not agreed to amending the ROD to change the release criteria. Please revise Section 5.6 to remove reference to revision of the Parcel G ROD.

10. **Appendix A, Section 2.0, Purpose and Objectives, Step 2 - Identify the Objective, Page 2-1:** The text does not appear to distinguish between potential contamination and background levels. Step 2 states that the background study is being conducted to "establish representative background data sets for soil ROCs, NORM radionuclides, and fallout ROCs for comparison and evaluation of soil data collected from the HPNS." This statement seems to imply that soil Radionuclides of Concern (ROCs) may be present in background that are not present due to Naturally Occurring Radioactive Material (NORM) or from fallout associated with nuclear tests or reactor accidents. There is a similar statement under Step 3 - Identify Inputs to the Objective. Please revise the text to clarify that only ROCs that are present due to NORM or fallout may be considered background.

11. **Appendix A, Section 2.0, Purpose and Objectives, Step 4-Define the Study Boundaries, Page 2-1:** Step 4 proposes an inconsistent sampling strategy. This section states that in Parcels B, C, D-1, and D-2, reference background surface soil samples will be collected from 0 to 6 inches below ground surface (bgs), and subsurface soil samples will be collected from 1- to 2-foot intervals to a depth of up to 10 feet bgs. However, at the off-base location, surface soil samples will be collected from 0 to 6 inches bgs and subsurface samples to a depth of 10 feet bgs are not proposed. It is unclear why samples collected from on-base

background locations will be obtained from the subsurface in 1- to 2- foot internals to a depth of up to 10 feet bgs, but off-site background samples will only be collected from 0 to 6 inches. Collecting subsurface samples from the off-site location will provide valuable information about the depth of deposition and transport of radionuclides from fallout, as well as the potential differing distribution of NORM at depth. In addition, a lithological profile of off-site subsurface soil should be completed in order to provide additional support to any correlation drawn from soil profiles and NORM collected at the HPNS. Please revise the off-site sampling approach to include collection of subsurface samples.

- 12. Appendix A, Section 2.0, Purpose and Objectives, Step 5 – Develop Decision Rules and Step 6 – Specify the Performance Criteria, Pages 2-1 and 2-1:** The performance criteria discussion states that the background data sets will be evaluated for suitability based on statistical tests, but prior to performing the statistical tests, an evaluation of whether the naturally occurring radionuclides that are also ROCs should be evaluated to determine if the U-238 parent and daughter radionuclides, and as applicable, Th-232 and daughter radionuclides are in secular equilibrium. This is necessary to ensure elevated ROCs that are present due to contamination are not eliminated as outliers. Please revise this discussion to address the need to evaluate whether the U-238 and Th-232 series radionuclides are in secular equilibrium before performing statistical tests to identify outliers or to derive population estimators for comparison to site data.
- 13. Appendix A, Section 3.1.6, Field Instrumentation, Gamma Detectors, Page 3-5 and 3-6:** The text provides a list of two gamma survey instruments that will be used in the RBA but does not provide the detection limits for each instrument. Please revise Appendix A to include the efficiency and detection limits for the gamma survey instruments and the required instrument sensitivities that meet the data quality objectives for identifying radionuclides at background levels.
- 14. Appendix A, Section 3.1.7, Laboratory Analysis, Pages 3-6 and 3-7:** Section 3.1.7 lists the radionuclides that will be analyzed but does not reference the Quality Assurance Project Plan (QAPP) that contains the QC requirements or detection limits for such analysis. Please revise Appendix A to include this information or reference the QAPP that includes this information.
- 15. Appendix A, Section 3.2.4, Surface Soil Sampling Process, Pages 3-9 and 3-10 and Section 3.2.5.2, Subsurface Soil Sample Collection, Pages 3-11 and 3-12:** Please specify the required sampling volume and sample container in Section 3.2.4 and Section 3.2.5.2. Similarly, please specify the type of container that will be used to store soil intervals not designated for sampling (e.g., will core boxes or sealed jars be used?).
- 16. Appendix A, Section 3.2.4, Surface Soil Sampling Process, Pages 3-9 and 3-10 and Section 3.2.5.2, Subsurface Soil Sample Collection, Pages 3-11 and 3-12:** Please provide decontamination procedures for drill rig tooling, hand tools, and bowls used for mixing should be specified in the text.

**Appendix A, Section 4.2 Analytical Data Evaluation:** The Parcel G Work Plan Appendix A Soil Reference Background Area Work Plan does not provide a comprehensive strategy for selecting a single background value for comparison to site data and use in demonstrating compliance with the ROD RGs. Such a strategy should consider the following inputs: the population distribution, characteristics (i.e. skewness) and variance for each background reference location or multiple locations; the frequency of detection, and site-specific factors (i.e. soil type, topography, depth, homogeneity or heterogeneity of the data set, or other). In addition, analysis of the background data set should include the appropriate statistical calculations or charts and graphs (such as QQ Plots) to be used to help inform the selection of a single background value for use in comparison to ROD RGs. Further, Appendix A does not indicate whether background data sets will be validated and at what frequency or whether the complete data packages and data validation reports will be made available to the regulators for review prior to the selection of background values for use in compliance assessment. Finally, Appendix A does not include a requirement for one or more scoping and decision-making discussions between the regulators and the Navy for selecting the most appropriate background value for assessing compliance with the Parcel G ROD RGs. Please revise Appendix A of the Parcel G Work Plan to include this level of detailed discussion to explain how background data sets will be evaluated, and to include a requirement to conduct scoping/decision discussions with the regulators for the purpose of selecting the most conservative and appropriate background value for use in compliance assessment. In addition, please ensure Appendix A discusses the requirements for data validation for background data, and includes a requirement to submit the full data packages, data summary tables, and data validation reports (from third-party data validators) to the regulators for review as part of the background data set collection and evaluation prior to initiation of the Parcel G trench and building site evaluation.

**Commented [A17]:** Jana and Karla drafted this after discussion 8/7. Waiting for Donna and David review

**17. Appendix A, Section 4.2.2 Identify Outliers, Page 4-2:** This section states that background data values will be evaluated to determine if any are outside of the expected distribution using Dixon's and Rosner's statistical outlier tests, both of which assume the data are normally distributed. However, the previous Section 4.1.2 (Outliers test) states, "Because environmental data tend to be right-skewed, a test that relies on an assumption of a normal distribution may identify a relatively large number of mathematical outliers." Section 4.1.2 also states that outliers identified in statistical test will be reviewed to determine whether any suitable reasons (e.g., a potential analytical error) exist to exclude them from further calculations, and confirmed outliers will be removed from individual data sets. As such, EPA recommends that all background data sets be evaluated using non-parametric statistical tests to evaluate population estimators (i.e., such as mean, standard deviation, and others) and potential outliers. Please revise Section 4.2.2 to address this concern. Also, please ensure all naturally occurring radionuclides that are also ROCs undergo an evaluation to determine if the U-238 and Th-232 decay chains are in secular equilibrium prior to conducting any outlier evaluations to ensure ROCs that are present due to contamination are not eliminated.

**18. Appendix A, Section 4.3, Reporting, Page 4-4:** This section states that information from other San Francisco Bay Area radiological background studies may be referenced in the BRA report as appropriate. Please also state how the Navy will determine if the other San Francisco background data sets are sufficiently comparable/representative of conditions/soils at the Hunters Point Shipyard.